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The Memory Bus

The memory bus is the set of wires that is used to carry memory addresses and data to and from the system RAM. The memory bus in most PCs is also shared with the processor bus, connecting the system memory to the processor and the system chipset. The memory bus is part of the PC's hierarchy of buses, which are high-speed communications channels used within the computer to transfer information between its components. See here for more details on buses, and here for a description of the memory bus in relation to the processor, as well as memory bus specifics for different processors.

The memory bus is made up of two parts: the *data bus* and the *address bus*. When people just make reference to "the memory bus" they are usually referring to the data bus, which carries actual memory data within the PC. The address bus is used to select the memory address that the data will come from or go to on a read or write.

The wider the data part of the bus, the more information that can be transmitted simultaneously. Wider data buses generally mean higher performance. The speed of the bus is dictated by the system clock speed and is the other main driver of bus performance. The bandwidth of the data bus is how much information can flow through it, and is a function of the bus width (in bits) and its speed (in MHz). This is described in more detail here.

You can think of the data bus as a highway; its width is the number of lanes and its speed is how fast the cars are traveling. The bandwidth then is the amount of traffic the highway can carry in a given unit of time, which is a function of how many lanes there are and how fast the cars can drive in them. More bandwidth means better performance--if and only if the rest of the system can make use of the increased bandwidth.

The width of the address bus controls the *addressability* of the system memory, which is how much system memory the processor can read or write to. Continuing the highway analogy, the address bus carries information about the different exit numbers on the highway. The wider the address bus, the more digits the exit number could have, and the more exits that could be supported on the highway. Most systems can address far more memory than they will ever use. See this section that shows address bus widths and addressability for various processors.

Next: The Processor-Memory Bottleneck

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